WHAT IS CLAIMED IS:

1. A leptin receptor (OB-R) polypeptide.

2. The leptin receptor of claim 1 characterized by
a) specific binding to leptin under physiological conditions;
b) expression at high levels in cells of the hypothalamus, and expression at lower levels in adipose tissue, testes, heart, and brain; and
c) having sequence similarity to gp130 cytokine receptors.

3. The leptin receptor of claim 1 which is encoded by a nucleic acid which is identifiable with a polymerase chain reaction (PCR) probe selected from group consisting of a probe for clone 7 (forward primer SEQ ID NO:42 and reverse primer SEQ ID NO:43), a probe for clone 11 (forward primer SEQ ID NO:44 and reverse primer SEQ ID NO:45), and both clone 7 and clone 11.

4. The leptin receptor of claim 3, which is encoded by a nucleic acid which is identifiable with a PCR probe selected from the group consisting of a probe for clone 42 (forward primer SEQ ID NO:26 and reverse primer SEQ ID NO:46); a probe for clone 46 (forward primer SEQ ID NO:47 and reverse primer SEQ ID NO:48); a probe for clone 58 (forward primer SEQ ID NO:47 and reverse primer SEQ ID NO:50); a probe for clone S14 (forward primer SEQ ID NO:51 and reverse primer SEQ ID NO:52); and a probe for clone S3 (forward primer SEQ ID NO:53 and reverse primer SEQ ID NO:54).

5. The leptin receptor of claim 1 which is selected from the group consisting of OB-Ra, OB-Rb, OB-Rc, OB-Rd, and OB-Re, or allelic variants thereof.

6. The leptin receptor of claim 1 which is selected from the group consisting of:

a) N-terminal corresponding to OB-Ra through Lys^{889} and C-terminal corresponding to a C-terminal selected from the group consisting of OB-Rb, OB-Rc, and OB-Rd after Lys^{889};

b) N-terminal corresponding to OB-Rb or OB-Rc through Lys^{889}, and C-terminal corresponding to OB-Ra or OB-Rd after Lys^{889};

c) N-terminal corresponding to OB-Rd through Lys^{889}, and C-terminal corresponding to OB-Ra, OB-Rb, or OB-Rc;

d) N-terminal corresponding to OB-R from Pro^{664} to Lys^{889}, and C-terminal corresponding to OB-Ra, OB-Rb, OB-Rc, and OB-Rd;

e) N-terminal corresponding to OB-R from Met^{733} to Lys^{889}, and C-terminal corresponding to OB-Ra, OB-Rb, OB-Rc, and OB-Rd;

f) N-terminal selected from the group consisting of OB-Ra, OB-Rb, OB-Rd, and OB-R from Pro^{664}, to His^{796}, and OB-Re from His^{796};

g) N-terminal corresponding to OB-R from Met^{733} to His^{796}, and OB-Re from His^{796}, or allelic variants thereof.

7. The leptin receptor of claim 1 wherein

a) the N-terminal sequence is selected from the group consisting of

i) amino acid residues 1-889;

ii) amino acid residues 23-889;

iii) amino acid residues 28-889;

iv) amino acid residues 133-889;

v) amino acid residues 733-889;

vi) amino acid residues 1-796;

vii) amino acid residues 23-796;

viii) amino acid residues 28-796;

ix) amino acid residues 133-796; and

x) amino acid residues 733-796; and

b) the C-terminal sequence is selected from the group consisting of

i) SEQ ID NO:11;

ii) SEQ ID NO:12;

iii) SEQ ID NO:13;

iv) SEQ ID NO:14; and

v) SEQ ID NO:15;

wherein the numbering is based on the amino acid sequence of the full length transcribed murine leptin receptor, including the signal peptide, or allelic variants thereof.

8. The leptin receptor of claim 1 which is a soluble receptor.

9. The leptin receptor of claim 8 which is selected from the group consisting of

a) OB-Re;

b) an N-terminal sequence which selected from the group consisting of OB-Ra, OB-Rb, OB-Rd, and OB-R from Pro^{664}, through His^{799}, and a C-terminal sequence which is OB-Re from His^{796};

c) an N-terminal sequence which is selected from the group consisting of

i) amino acid residues 1-796;

ii) amino acid residues 23-796;

iii) amino acid residues 28-796;

iv) amino acid residues 133-796; and

v) amino acid residues 733-796; and

a C-terminal sequence which is SEQ ID NO:15;

wherein the numbering is based on the amino acid sequence of the full length transcribed murine leptin receptor, including the signal peptide, or allelic variants thereof.

10. The leptin receptor of claim 1 which comprises a transmembrane domain, and is an integral membrane protein.

11. The leptin receptor of claim 10 which further comprises a JAK binding motif selected from "Box 1," "Box 2," and "Box 1" and "Box 2", which motif is downstream of the transmembrane domain.

12. The leptin receptor of claim 1 which is a human leptin receptor.

13. The leptin receptor of claim 1 which is a murine leptin receptor.

14. The leptin receptor of claim 12 comprising an amino acid substitution selected from the group consisting of: Phe for Ser^{36}; Asp for Tyr^{44}; Ser for Leu^{49}; Pro for Ser^{54}; Leu for Ser^{60}; Ala for His^{63}; Ala for Thr^{66}; Ala for Pro^{70}; Ile for Thr^{77}; Tyr for His^{78}; Pro for Ser^{80}; Gly for Arg^{92}; Gly for Asp^{96}; Thr for Ala^{103} or Ile^{106}; Ser for Leu^{118}; Gly for Asp^{124}; Thr for Lys^{138}; Pro for Ser^{146}; Asp for Val^{164}; Leu for Gln^{177}; Asp for Gly^{179}; Gly for Glu^{192}; deletion for Cys^{193}; His for Leu^{197}; Ser for Ile^{221}; Leu for Asn^{233}; Leu for Ser^{273}; deletion for Thr^{278}; Ala for Asp^{285}; Glu for Lys^{286}; Ser for Gly^{310}; Arg for Met^{370}; Ile for Ser^{379}; Ser for Phe^{394}; Ala for Glu^{417}; Gly for Glu^{459}; Ser for Ile^{476}; Thr for Ile^{482}; Thr for Ile^{551}; His for Tyr^{586}; Lys for Ile^{648}; Ala for Ser^{686}; His for Cys^{687}; Thr for Ile^{759}; Ile for Asn^{776}; Asp for Gly^{781}; Gly for Glu^{782}; Gly for Ser^{827}; Ala for Asp^{832}; Arg for Pro^{892}; Thr for Glu^{893}; Asp for Thr^{894}; or Leu for Glu^{896}, wherein the numbering of the amino acids corresponds to the numbering adopted for the human leptin receptor, including the signal sequence.

15. An antigenic fragment of the leptin receptor of claim 1.

16. The antigenic fragment of claim 15 which is selected from the group consisting of SEQ ID NO:32, SEQ ID NO:33, and SEQ ID NO:34.

17. A derivative of the leptin receptor of claim 8 or 9 attached to a chemical moiety.

18. The derivative of claim 15 wherein the chemical moiety is a water-soluble polymer.

19. The derivative of claim 16 wherein the water soluble polymer is polyethylene glycol.

20. An isolated nucleic acid encoding a leptin receptor of claim 1.

21. An isolated nucleic acid encoding a leptin receptor of claim 5, 6, or 7.

22. An isolated nucleic acid encoding a leptin receptor of claim 8 or 9.

23. An isolated nucleic acid encoding a leptin receptor of claim 10 or 11.

24. An isolated DNA molecule encoding on expression a leptin receptor polypeptide selected from the group consisting of:

a) a polypeptide coding sequence of a DNA molecule of SEQ ID NO:1, 3, 5, 7, or 9;

b) a DNA molecule complementary to the DNA molecule defined in (a);

c) a DNA molecule which hybridizes to the DNA molecule of (a) or (b), or a hybridizable fragment thereof;

d) a DNA molecule which is identifiable with a polymerase chain reaction (PCR) probe selected from group consisting of a probe for clone 7 (forward primer SEQ ID NO:42 and reverse primer SEQ ID NO:43), a probe for clone 11 (forward primer SEQ ID NO:44 and reverse primer SEQ ID NO:45), and both clone 7 and clone 11; and

e) a DNA molecule that codes on expression for the polypeptide encoded by any of the foregoing DNA molecules.

25. The DNA molecule of claim 24 which is human.

26. The DNA molecule of claim 24 which is murine.

27. The DNA molecule of claim 24 which codes on expression for a polypeptide selected from the group consisting of:

a) a leptin receptor selected from the group consisting of OB-Ra, OB-Rb, OB-Rc, OB-Rd, and OB-Re, or allelic variants thereof;

b) a leptin receptor selected from the group consisting of:

i) N-terminal corresponding to OB-Ra through Lys^{889} and C-terminal corresponding to a C-terminal selected from the group consisting of OB-Rb, OB-Rc, and OB-Rd after Lys^{889};

ii) N-terminal corresponding to OB-Rb or OB-Rc through Lys^{889}, and C-terminal corresponding to OB-Ra or OB-Rd after Lys^{889};

iii) N-terminal corresponding to OB-Rd through Lys^{889}, and C-terminal corresponding to OB-Ra, OB-Rb, or OB-Rc;

iv) N-terminal corresponding to OB-R from Pro^{664} to Lys^{889}, and C-terminal corresponding to OB-Ra, OB-Rb, OB-Rc, and OB-Rd;

v) N-terminal corresponding to OB-R from Met^{733} to Lys^{889}, and C-terminal corresponding to OB-Ra, OB-Rb, OB-Rc, and OB-Rd;

vi) N-terminal selected from the group consisting of OB-Ra, OB-Rb, OB-Rd, and OB-R from Pro^{664}, through His^{796}, and OB-Re from His^{796}, and

vii) N-terminal corresponding to OB-R from Met^{733} to His^{796}, and OB-Re from His^{796},

or allelic variants thereof;

c) a leptin receptor wherein

i) the N-terminal sequence is selected from the group consisting of

(1) amino acid residues 1-889;

(2) amino acid residues 23-889;

(3) amino acid residues 28-889;

(4) amino acid residues 133-889;

(5) amino acid residues 733-889;

(6) amino acid residues 1-796;

(7) amino acid residues 23-796;

(8) amino acid residues 28-796;

(9) amino acid residues 133-796; and

(10) amino acid residues 733-796; and

ii) the C-terminal sequence is selected from the group consisting of

(1) SEQ ID NO:11;

(2) SEQ ID NO:12;

(3) SEQ ID NO:13;

(4) SEQ ID NO:14; and

(5) SEQ ID NO:15;

wherein the numbering is based on the amino acid sequence of the full length transcribed murine leptin receptor, including the signal peptide, or allelic variants thereof.

28. A nucleic acid molecule having a nucleotide sequence corresponding or complementary to the DNA sequence set forth in SEQ ID NO:1, 3, 5, 7 or 9.

29. An oligonucleotide hybridizable under stringent conditions to the nucleic acid molecule of claim 24.

30. An oligonucleotide hybridizable under stringent conditions to the nucleic acid molecule of claim 27.

31. An oligonucleotide hybridizable under stringent conditions to the nucleic acid molecule of claim 28.

32. The oligonucleotide of claim 29, 30, or 31 selected from the group consisting of SEQ ID NO:20, SEQ ID NO:21, SEQ ID NO:22, SEQ ID NO:23, SEQ ID NO:24, SEQ ID NO:25, SEQ ID NO:26, SEQ ID NO:27, SEQ ID NO:28, SEQ ID NO:29, SEQ ID NO:30, SEQ ID NO:31, SEQ ID NO:35, SEQ ID NO:36, SEQ ID NO:37, SEQ ID NO:38, SEQ ID NO:39, SEQ ID NO:40, SEQ ID NO:41, SEQ ID NO:42, SEQ ID NO:43, SEQ ID NO:44, SEQ ID NO:45, SEQ ID NO:46, SEQ ID NO:47, SEQ ID NO:48, SEQ ID NO:49, SEQ ID NO:50, SEQ ID NO:51, SEQ ID NO:52, SEQ ID NO:53, and SEQ ID NO:54.

33. The oligonucleotide of claim 32 which is labeled.

34. The nucleic acid of claim 20, 21, 22, or 23 which is DNA.

35. A vector comprising the DNA of claim 34.

36. A vector comprising the DNA of claim 24, 27, or 28.

37. An expression vector which comprises the DNA of claim 34, operatively associated with an expression control sequence.

38. An expression vector which comprises the DNA of claim 24, 27, or 28, operatively associated with an expression control sequence.

39. An unicellular host transformed or transfected with a DNA molecule of claim 34.

40. An unicellular host transformed or transfected with a DNA molecule of claim 24, 27, or 28.

41. An unicellular host transformed or transfected with an expression vector of claim 37.

42. An unicellular host transformed or transfected with an expression vector of claim 38.

43. The unicellular host of claim 41 selected from the group consisting of bacteria, yeast, mammalian cells, plant cells, and insect cells, in tissue culture.

44. The unicellular host of claim 42 selected from the group consisting of bacteria, yeast, mammalian cells, plant cells, and insect cells, in tissue culture.

45. The unicellular host of claim 43, wherein the unicellular host is selected from the group consisting of *E. coli, Pseudomonas, Bacillus, Streptomyces, Saccharomyces, Pichia, Candida, Hansenula, Torulopsis*, CHO, R1.1, B-W, LM, COS 1, COS 7, BSC1, BSC40, BMT10, and Sf9 cells.

46. The unicellular host of claim 44, wherein the unicellular host is selected from the group consisting of *E. coli, Pseudomonas, Bacillus, Streptomyces, Saccharomyces, Pichia, Candida, Hansenula, Torulopsis*, CHO, R1.1, B-W, LM, COS 1, COS 7, BSC1, BSC40, BMT10, and Sf9 cells.

47. A method for preparing a leptin receptor polypeptide comprising:

a) culturing a cell according to any claim 43 under conditions that provide for expression of the leptin receptor polypeptide; and

b) recovering the expressed polypeptide.

48. A method for preparing a leptin receptor polypeptide comprising:

a) culturing a cell according to any claim 44 under conditions that provide for expression of the leptin receptor polypeptide; and

b) recovering the expressed polypeptide.

49. The oligonucleotide of claim 29, 30, or 31 which is an antisense nucleic acid that hybridizes with an mRNA encoding leptin receptor.

50. A ribozyme which cleaves an mRNA encoding a leptin receptor.

51. A transgenic vector comprising a DNA molecule of claim 34.

52. A transgenic vector comprising a DNA molecule of claim 24, 27, or 28.

53. An antibody specific for a leptin receptor of claim 1.

54. An antibody according to claim 53 which is a monoclonal or polyclonal antibody.

55. An antibody according to claim 53 labeled with a detectable label.

56. An immortal cell line that produces a monoclonal antibody according to claim 54.

57. A method for preparing an antibody specific for a leptin receptor, comprising:

a) immunizing a host animal with the leptin receptor of claim 1 admixed with an adjuvant; and

b) obtaining antibody from the immunized host animal.

58. A method for preparing an antibody specific for a leptin receptor, comprising:

a) conjugating a peptide having a sequence selected from the group consisting of SEQ ID NO:32, SEQ ID NO:33, and SEQ ID NO:34 to a carrier protein;

b) immunizing a host animal with the peptide-carrier protein conjugate of step (a) admixed with an adjuvant; and

c) obtaining antibody from the immunized host animal.

59. A method for measuring the presence of a leptin receptor in a sample, comprising:

a) contacting a sample suspected of containing a leptin receptor with an antibody that specifically binds to the leptin receptor under conditions which allow for the formation of reaction complexes comprising the antibody and the leptin receptor; and

b) detecting the formation of reaction complexes comprising the antibody and leptin receptor in the sample,

wherein detection of the formation of reaction complexes indicates the presence of leptin receptor in the sample.

60. The method according to claim 59 wherein the antibody is bound to a solid phase support.

61. An *in vitro* method for evaluating the level of leptin receptor in a biological sample comprising:

a) detecting the formation of reaction complexes in a biological sample according to the method of claim 59 or 60; and

b) evaluating the amount of reaction complexes formed, which amount of reaction complexes corresponds to the level of leptin receptor in the biological sample.

62. An *in vitro* method for detecting or diagnosing the presence of a disease associated with elevated or decreased levels of leptin receptor in a subject comprising:

a) evaluating the level of leptin receptor in a biological sample from a subject according to claim 61; and

b) comparing the level detected in step (a) to a level of leptin receptor present in normal subjects or in the subject at an earlier time,

wherein an increase in the level of leptin receptor as compared to normal levels indicates a disease associated with elevated levels of leptin receptor, and decreased level of leptin receptor as compared to normal levels indicates a disease associated with decreased levels of leptin receptor.

63. A pharmaceutical composition comprising a soluble leptin receptor according to any of claims 8 or 9, and a pharmaceutically acceptable carrier.

64. A method for treating obesity in a subject comprising administering a therapeutically effective amount of the pharmaceutical composition of claim 63.

65. The method according to claim 64, further comprising administering a treatment for diabetes, high blood pressure, and high cholesterol.

66. A body appearance improving cosmetic composition for reducing the body weight of an individual comprising a soluble leptin receptor of claim 8 or 9, and an acceptable carrier.